Gas Journal

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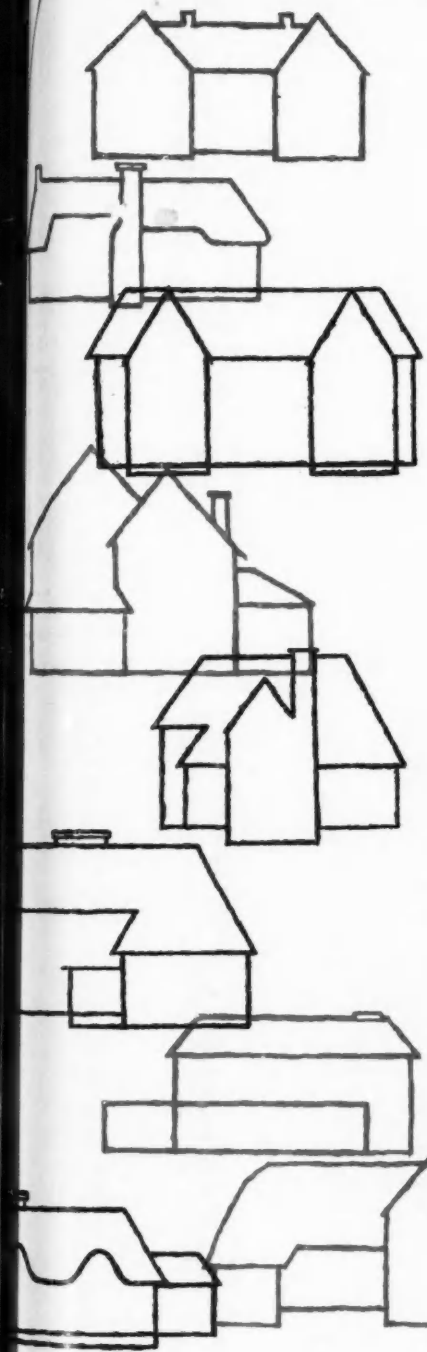
THE UNIVERSITY OF MICHIGAN



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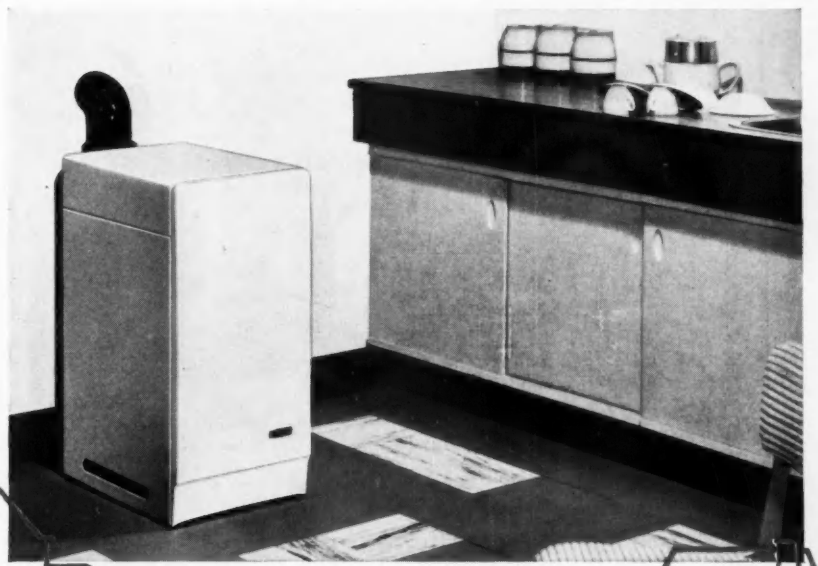

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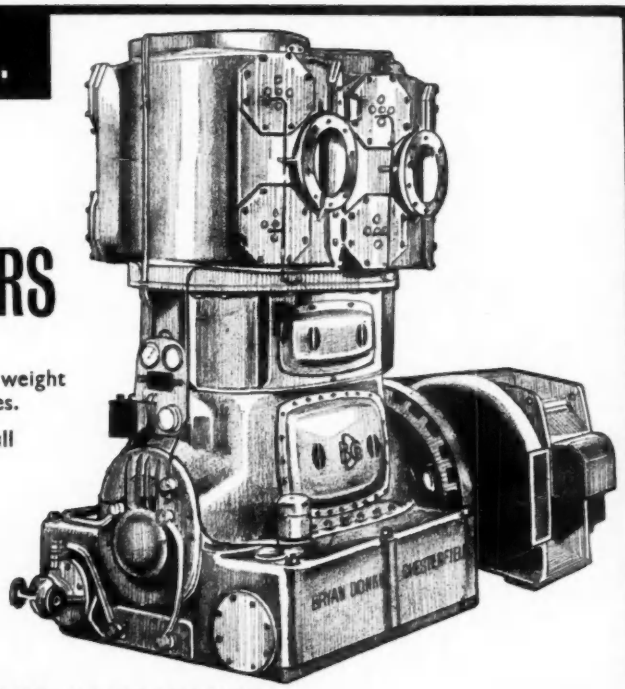

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Gas Journal

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WEDNESDAY, JANUARY 4, 1961

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Publishers' Notice See Page 570, December 28, 1960

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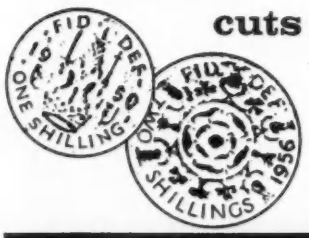

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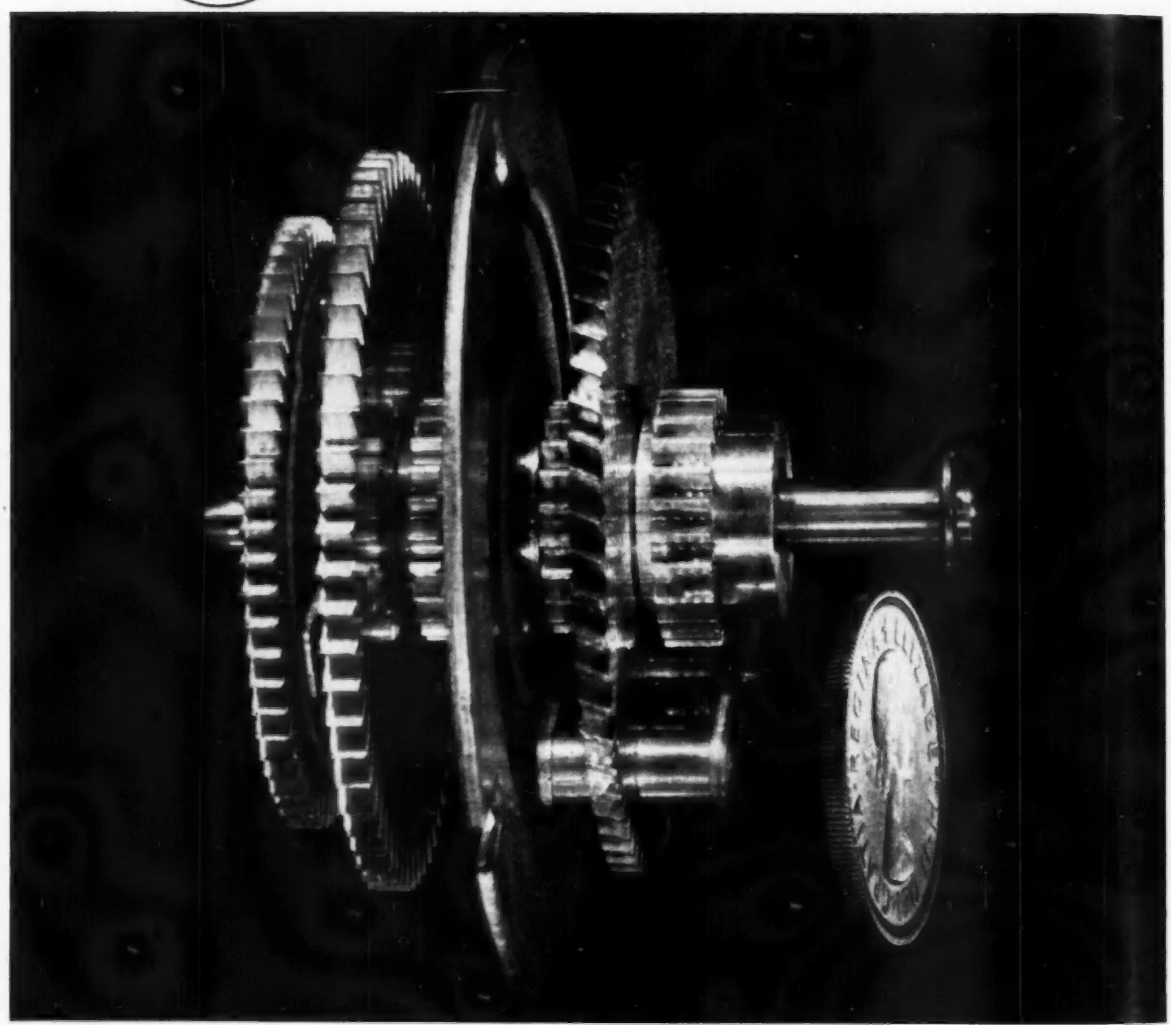

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Gas Journal

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Can we compete without natural gas?

ARTICLES on natural gas in the Sahara and its effect on fuel supplies in Europe, which appeared in the *Financial Times* and the *Sunday Times* recently, have focused our attention once again on modern fuel developments on the Continent and their possible influence on British trade and industry.

Natural gas in Europe seems strangely unfamiliar. We have grown accustomed to hearing about its exploitation in America, where it has taken the place of manufactured gas in so many of the large cities. Its development in Canada resulting from the discovery of extensive gas and oil fields in different parts of the country, is now quite familiar to us, especially since the laying of the trans-Canada pipeline.

Though we have read a good deal about the discoveries of natural gas in the Po valley in Northern Italy, the great gas field at Lacq in South Western France, and the extensive developments in natural gas and oil production in the Sahara, it seems to have only recently dawned on many in this country what a tremendous part these sources may play on the supply of fuel to both Continental Europe and Great Britain, during the present decade.

This country's industrial supremacy has always been traditionally linked with coal, especially at a time when that particular fuel was the only one of any consequence; the quality and quantities of coal readily available for British industry then, were equal to any found elsewhere in the civilised world. Great Britain has therefore based all her industrial thinking on coal, and has built up a highly organised coal-producing industry. This particular industry necessitated the creation of whole communities to supply the labour needed to cut the coal and bring it to the consumer.

The spread of oil as a fuel for industry has brought it home to industrialists throughout Britain that perhaps there were other fuels which were not only as good as coal thermally, but were superior in the cheapness with which they could be handled, and that they could be utilised under conditions far more in accordance with modern thought; furthermore, the type of furnace burning modern fuels could be more easily integrated into mass production lines. These particular advantages of refined fuels are those which we constantly stress when attempting to put forward a case for gas—a slightly more expensive fuel—in competition with solid fuels and oil.

It is quite clear that if any change in production methods should reduce the price of gas to the large industrial consumer as well as to the housewife, not only will there be a rise in gas consumption but presumably a fall in the fuel costs of manufactured articles.

Should natural gas be developed on a large scale throughout Europe—and there seems every likelihood of this being possible—industrial activity is likely to be speeded up with a consequent reduction in prices. If, however, Britain is unable to benefit similarly, it would seem that competition may well become too fierce for her in world markets.

News of big developments in the Sahara point to the early completion of a pipeline from the Hassi r' Mel gas field to the Mediterranean coast, with a view to transporting the natural gas to Continental Europe. If it is to be carried by pipeline, three routes have been proposed. These are through Morocco and across the Straits of Gibraltar to Spain, from Mostaganem, between Oran and Algiers, to Cartagena in Spain, or through Tunisia to Cap Bon and across to Marsala in Sicily. The route through Gibraltar has the advantage of a short sea crossing but passes through country where there are likely to be few consumers, while the Cartagena route involves a submarine pipeline of some 120 miles. If the gas were to be brought through Sicily, there would be a number of advantages, among them a moderate, 77-mile, submarine crossing, a means of developing industry in Southern Italy, and the arrival of the gas in South East France, North Western Switzerland and the Ruhr at a reasonable price to compete with locally produced fuels.

Whichever route is decided upon, it is calculated that

WE WISH OUR READERS

A HAPPY AND PROSPEROUS NEW YEAR

by the mid 1960's, natural gas may well account for as much as 10% of the fuel requirements of Europe, made up equally of indigenous and overseas sources. We understand that a pipeline across the English Channel is perfectly feasible technically and would no doubt become a probability if there was something of value to convey, or if British industry decided that the import of natural gas was necessary to facilitate its competitive position in world markets.

Until now the Gas Council appears to have taken no part in the importation of natural gas other than the purely experimental voyages of the Methane Pioneer. These experiments have, however, put it into a position of possessing more technical know-how on this particular subject than anyone else. We understand that a French company, Compagnie du Méthane Saharien, have been negotiating with the Gas Council and Conch, the methane tanker subsidiary of Shell and Continental Oil, for the sale of 1,000 mill. cu.m. of natural gas—about 10% of the total consumption of gas in Great Britain. Should negotiations be successful it is likely that plans to build a refrigerating plant at Arzew on the Algerian Mediterranean coast will go forward, which would take about three years to complete. The Gas Council, with its experience of carrying methane across the Atlantic, is, we feel, going to drive a very hard bargain, for any exports to Britain are likely to find a ready-made market without any further responsibility to the French exporting company. In fact, so important is the Gas Council's participation, that on it may depend the decision to export gas to Europe by pipeline or tanker.

If this is so, will it be given a free hand to act strictly in accordance with its own decisions on what is economic or not? Pressure is likely to be brought to bear by the coal industry to prevent any further fall in the amount of coal processed by the gas industry, either carbonised or gasified, so we feel that the room for manoeuvre is likely to be restricted.

Irrespective of the possible pressure from the National Coal Board, can industry in this country afford to buy any but the cheapest and best fuel for its factories? Clearly it must buy in the most favourable market.

Unconventional convention

AS a nation we are perhaps a little less addicted to ballyhoo than our friends across the Atlantic, but there are times when (speaking personally) we regard their more extrovert gambollings with just a tinge of envy.

We have been looking, somewhat goggle-eyed, at the report in the American Gas Association's journal of the A.G.A. Convention held recently in Atlantic City. The event has no parallel in this country, and to describe it as a cross between the annual meeting of the Institution of Gas Engineers and the Gas Sales and Service Conference would not only give an imperfect impression of its scope but would be wholly misleading as to its composition and atmosphere. They have only this in common—that they exist to further the progress of the gas industry.

The reserved Englishman, studying the antics of the American conference delegate, may smile tolerantly and offer up a small prayer of gratitude that ' it could never happen over here.' Perhaps it couldn't, but let us not forget that, almost against our wills, we are gradually having to accept many American techniques in commercial life. Our Transatlantic counterparts have learned the value of showmanship and light relief in the organisation of their business discussions and there is much to be said for it as a stimulant. How would British gas conference delegates react to the full American treatment? We believe that they would love it—as long as they were on the receiving end. But an essential ingredient of the American technique is participation, and from this the average British delegate would shy away like a frightened horse. He would have to be tamed, taught and integrated; and after making due allowance for a less flamboyant personality he could do it—maybe even with advantage.

At Atlantic City the A.G.A. President, Wister H. Ligon, opened the convention by raising a long lamplighter's wand and touching into life a flaming gas luau torch. Attended by 7,000 delegates, guests and ladies, the convention lasted for four days and drew capacity audiences to general sessions, section meetings, the 'Festival of Flame' exhibition (which showed 200 separate exhibits by 150 companies), and other events. A tighter speaking programme concentrated on a limited number of top speakers and the convention was studded with often dramatic innovations.

There was for example a boardwalk parade to the convention hall for the opening ceremonies, there were doorprize drawings with a new Chrysler Valiant as top prize, and a 'Gasorama' show illustrating gas facts through stunts and demonstrations. Although these were the frothy trimmings of what was basically a tough, down-to-earth conference, there were other impressive facets of the affair which should give the British delegate food for thought. We have in mind the continuous closed-circuit television programming, on which a steady stream of talks and interviews with gas industry figures was broadcast over receivers throughout the auditorium and in delegates' rooms at all major hotels. And the gas industry Press conference attended by 75 representatives of metropolitan newspapers, national magazines, etc., and the editors' branch at which gas industry leaders met writers and editors from influential publications. Whatever you may think of the value of such ideas by British standards, as a piece of organisation they command respect.

This was a business conference, but the promoters found it paid to dress it up like a cross between a presidential election and Mardi Gras. There were brass bands, men's choruses, cowgirls, even Hawaiian hula girls. Before we dismiss it all as complete nonsense and indicative of some of the things we admire least in the American character, it might be well to consider for a moment whether we are quite sure there is nothing here from which we may profit. Granted the British gas industry is a sober, conscientious and technically accomplished affair, but are we not sometimes just a little dull?

How the I.G.E. fared in 1960

INTERNATIONAL CONFERENCE ARRANGEMENTS

AN increase of 2% in the membership of the Institution of Gas Engineers during the year 1960 is reported—the same rate of growth recorded each year since 1956.

The death of 25 members is recorded—among them two Honorary Members, Mr. F. M. Birks, C.B.E., who was President of the Institution for the year 1950-51, and Sir Ernest Smith, C.B.E., both of whom had distinguished careers in the gas industry.

The Institution continues to collaborate in all aspects of the work of the International Gas Union, of which it is a founder member.

It is represented on the Council of the Union by Mr. W. K. Hutchison, C.B.E., Dr. J. Burns, G.M., and Dr. W. T. K. Braunholtz, O.B.E.

New techniques

Two Past Presidents of the Institution, Mr. W. K. Hutchison, C.B.E., and Mr. G. E. Currier, O.B.E., are Chairmen of two of the standing committees of the Union, dealing respectively with new gas distribution techniques and the consideration of safety conditions in domestic, commercial and industrial gas installations.

The Institution's assistant secretary is secretary of both of these committees.

The Institution is also represented on all other committees of the Union, dealing with a wide variety of subjects including the harmonisation of essential clauses in specifications for the approval and stamping of gas appliances, statistics, vocabulary and interchangeability of gases used for town purposes.

In Stockholm

Arrangements are well in hand for the 8th International Gas Conference, which is to be held in Stockholm from June 27-30, 1961, under the Presidency of Mr. B. M. Nilsson (Sweden).

Reports from all the Standing Committees will be presented and discussed at this conference, and there will also be reports on special topics prepared by the various member gas associations as a result of an international enquiry. In addition, a number of individual papers will be presented under the ægis of these associations.

The Institution will be responsible for reports on 'A Further Study of Unconventional Flues' and 'A Further Study of the Use of Petroleum Products for the Production of Town Gas.'

The following individual papers will be presented under the ægis of the Institution of Gas Engineers:—

(1) 'Heat Services by Gas in Houses and Flats,' by L. W. Andrew and D. R. Wills.

(2) 'Liquid Methane: A Review,' by J. Burns, G.M., and L. J. Clark, B.E.M.

(3) 'Developments in Industrial Gas Utilisation,' by R. F. Hayman and W. A. Simmonds.

Supplemental charter

The Queen has approved the grant to the Institution of a Supplemental Charter embodying the amendments agreed by Corporate Members at the 96th Annual General Meeting in 1959.

Amendments to the by-laws in accordance with the resolution of Corporate Members at that meeting have also been approved by the Privy Council.

The revised Royal Charter and By-Laws are being printed as a booklet, which will be sent to all members of the Institution, and they came into operation on January 1, 1961. One of the most significant effects of the revision is the initiation of two new classes of members, those of Companions and Graduates.

The introduction of the class of Companions will enable a widening of the membership of the Institution among those interested in its activities but not possessing the particular qualifications of examination training or occupation required for Corporate Membership.

Bridging the gap

The class of Graduates is initiated to bridge the gap in the current membership structure between the classes of Student Membership and Associate Membership, and is closely associated with a revision of the Education Regulations.

The Institution is represented by the President and Secretary on the General Committee of the Parliamentary and Scientific Committee, a non-party body formed with the object of providing a permament liaison between scientific bodies and members of both Houses of Parliament.

The committee submitted written and oral evidence to the Committee on the Rating of Charities and Kindred Bodies (Pritchard Committee), appointed by the Minister of Housing and Local Government, which has presented a report containing recommendations of considerable importance to all professional Institutions.

It is encouraging to note that in the Bill now before Parliament, cognisance has been taken of the recommendations of the Pritchard Committee.

The educational work of the Institution for the year 1959-60 is recorded in the 37th Report of the Gas Education Committee which was presented and discussed at the 26th Autumn Research Meeting.

Christmas lectures for young people continue to attract large and enthusiastic audiences wherever they are arranged.

A short refresher course for gas production engineers arranged by the Institution was held at Pembroke College, Oxford, during the Easter Vacation, 1960.

The course was designed for station engineers or their deputies and appropriate personnel from member firms of the Society of British Gas Industries were also invited.

There were 50 members of the course, 45 of whom came from area gas boards and the remaining five from the contracting companies.

Dr. A. E. Haffner, Chairman of the Gas Education Committee, was director of the course, which was officially opened by Mr. W. K. Hutchison, C.B.E., upon whose suggestion the course was initiated.

Five syndicates

Lectures from eminent authorities from both within and outside the industry were given and a good deal of time was devoted to discussion of these lectures by meetings of five syndicates.

The course was of an experimental nature, but its success far exceeded expectations, and it is proposed to arrange a similar course from April 9-15, 1961, at Pembroke College, Oxford, for gas distribution engineers.

It will follow a similar pattern to that adopted on the last occasion, but it is hoped to incorporate certain improvements as a result of the experience gained.

A short course for teachers of gas fitting, arranged by the Ministry of Education in collaboration with the Institution of Gas Engineers, was held at Southampton Technical College from July 17-23, 1960.

The emphasis of the course was on teaching techniques with particular reference to the teaching of craft science.

Sandwich courses

Sandwich Courses continue to play an important part in the educational activities of the Institution and of the area gas boards and constitute an an accepted means of training gas engineers.

It had been felt by some of the assessors, appointed by the Colleges upon the recommendation of the Institution, that the periods of practical training were not everywhere as well

Continued on page 25

SIR JOHN AIRD

A PRACTICAL GENIUS .... AND A MAN WHO BROUGHT GAS TO MILLIONS ....

Consider Clegg and

by F. Collingwood

EVERY age opens up fresh opportunities for higher standards of living, and at no time has progress been so swift as in the last hundred years. It is difficult to think of life without running water, gas and electricity, yet these are comparatively recent luxuries.

The 50th anniversary of the death of a well-known London contractor reminds us of this fact.

He was Sir John Aird, of the firm of John Aird & Co., and he grew rich laying the foundation of those amenities we now take for granted.

Gas, water, railways, docks, all these Aird helped to establish in places where their advent was a godsend. Not only had people all over Europe existed amid conditions that had changed little since the Middle Ages, but London also was just emerging from life bordering on the primitive.

John Aird was the second generation of a family which played a significant part in effecting the transition from oil to gas, and from stagnant to running water.

Switched interests

His father, John Aird senior, started life as a stonemason but, when it was discovered that gas could be harnessed for domestic use, he quickly switched his interests to this new source of power.

One of the gas companies in the London of his day was the Phœnix Gas Company at Greenwich, and Aird made himself so indispensable to them that he was appointed superintendent, a job he held for 20 years.

In 1848 he decided to use the knowledge thus acquired to launch out on his own as a contractor. There was plenty of work waiting for the right man, and he was soon busy all over London laying gas and water mains for various companies.

So it was that when his son, also John Aird, had completed his education, a well-established business was waiting to welcome him.

He was 18 when he joined his father in the firm, ready to carry on where the older man left off. As contractors, John Aird & Son—as it was then called—reckoned to undertake any job that offered, so the son found himself tackling a rare mixture of assignments.

His first real test was the removal of the Crystal Palace from Hyde Park to Sydenham, with all the dismantling and re-assembling that this entailed.

He was sustained in this formidable task by the knowledge that his father had been responsible for the original erection, and was therefore an expert in the matter.

That piece of engineering safely accomplished, he was able to turn his attention to gas and water. Here the demand seemed endless.

London was in dire need of reservoirs, so John Aird was called in to construct two, one at Hampton and the other at Staines.

In the service of gas, he was instrumental in erecting the Beckton plant of the Gas Light & Coke Company. That he must have displayed considerable expertise in the handling of these jobs is made plain by the advertisement they afforded him.

The name of John Aird became known overseas as a first-class constructor of gas mains and waterworks, and he found himself in the cities of Amsterdam, Copenhagen, and Berlin building the water systems.

As for gasworks, he was greatly in demand abroad, and will go down in history as the first man to illuminate parts of Russia, France, Italy and Brazil in this manner.

When unable to supervise installations personally, his advice was sought by companies all over the world, so eager were governments to modernise their countries by making gas available to their people.

As time went on, Aird's name also became linked with the building of railways and docks. Londoners will remember him for his work on the extensions on the Metropolitan, District and St. John's Wood lines.

But his chief claim to fame lies in his building of the Aswan and Asyût dams, on the Nile in Egypt.

An offer

For years Egypt had been obliged to shelve this essential project because she could not raise the necessary cash. Then, in 1898, along came John Aird with an offer to build the dams with all payments deferred until completion, and then by instalments spread over a number of years.

It can be imagined how gratefully the Egyptians accepted his offer. Without his generosity the building of these essential dams might have had to wait many more years.

Success made Aird rich, and he was able to indulge his love of art.

For eight years he represented North Paddington in Parliament, and further showed his interest in that district by holding office as Mayor for two consecutive years.

It was on the second of these occasions (1901) that Lord Salisbury recommended him for a baronetcy. He died on January 6, 1911, leaving estate sworn at £1,101,489 gross.

SAMUEL CLEGG

PROFESSOR E. F. ARMSTRONG wrote of Samuel Clegg: 'There was no other to whose zeal and ability the art of gas-making is so much indebted for the variety as well as the extensive utility of his inventions and improvements.'

It was similarly claimed by other writers that Murdoch, Boulton and Watt with all their inventive imagination and commercial sense, were less to be regarded as creators of the gas industry than were Winsor, 'in spite of his craziness,' and the elder Clegg.

Samuel Clegg, who scored successes in London and the North, died five years after his son, 'a wasting away of the lamp of life', as the romantic obituarist put it, 'which shone brightly so long, and then flickered and expired.'

Clegg, with Murdoch and Accum, contributed British highlights to the story which was begun when Philippe Lebon sought to light the streets of Paris with 'thermo-lamps', a genius lost when he was assassinated in the Champs Elyssées.

Frederick Accum was a German who came to Britain to Brande's pharmacy, to set up as consulting chemist; later he became lecturer, and was a pioneer in fighting food adulteration.

His book on 'The Process of Manufacturing Coal Gas' was essentially a scientific treatise written by a chemist.

TWO anniversaries of considerable significance for the British gas industry occur within the next few days. It is a hundred years this month since the obituary writers were busy paying their tribute to Samuel Clegg, rival to Murdoch and the Boulton-Watt makers of gas-producing plant—a practical genius in contrast to Accum, who excelled in chemical knowledge . . . . Then there is the fiftieth anniversary of the death of a well-known London contractor, Sir John Aird . . . . . gas, water, railway, docks, all these Aird helped to establish in places where their advent was a godsend.

Aird — we're greatly indebted to both

by M. Schofield

Winsor's work in pioneering the 'G.L.C.' has been outlined in a previous contribution (GAS JOURNAL, October 21, 1959), while Murdoch's story is well known.

Against this background of rival workers in the cause of gas lighting or manufacture, one looks back to Samuel Clegg on the occasion of his anniversary. He is seen as a railway engineer as well as a gas engineer; for like Murdoch, with his steam-car, or Accum, with his crusade for pure foods, he had other irons in the fire. Even more active in other fields away from the early gas industry was Samuel Clegg junior, at times confused with the father since he wrote a treatise on gas manufacture.

The treatise

But this 'Practical Treatise on the Manufacture and Distribution of Coal Gas' was simply the putting together of his father's long experience; for Clegg junior went from University College classes directly to railway engineering and later became a professor of civil engineering.

Clegg senior was born in Manchester on March 2, 1781, and had some chemical initiation as a pupil of John Dalton. He became apprentice to Boulton and Watt, and at the Soho foundry saw Murdoch's experiments on gas preparation; hence his first gas engineering was at Birmingham.

A rival

Yet he soon became a rival when he left the Soho partners, a move not unexpected if one follows the lukewarm and even hostile attitude of Boulton and Watt towards Murdoch's gas-lighting craze. The partners had opposed Murdoch's steam-carriage; and since they considered they had enough lawsuits over Watt's patents to last a lifetime, they were only persuaded to take up gas-making plant through Murdoch's obstinacy.

They spent up to £5,000 on the venture, laid in a huge stock of burners and thousands of feet of tubing, and in 1805 they illuminated the cotton-mills of Phillips and Lee, of Manchester, using almost a thousand burners.

Further practical examples of the Boulton and Watt concern came with the gas-making plant supplied to a second Manchester firm and then to one at Leeds.

His successes

Yet Samuel Clegg, before he became engineer to the Gas Light and Coke Company, had his successes which roused the Soho interests.

In December, 1805, during the Phillips and Lee contract, Murdoch wrote to Soho asking for materials to be forwarded 'in a more expeditious way than they have hitherto been done;' otherwise 'it is of no use to think of taking orders here, for your old servant Clegg is manufacturing them in a more speedy manner than it appears can be done at Soho.'

Clegg was given a contract to light the Sowerby Bridge cotton mills of Henry Lodge, and from this experience began his scheme for using lime for purifying the gas.

Later at Stonyhurst College he justified a claim for a lime purifier, while in one of Clegg's designs was included a paddle at the base of the gas holder for agitating the lime.

The earliest use of lime had the insignificant aim to remove carbon dioxide; but later came the urge to remove hydrogen sulphide, to remove 'the Soho stink' which offended 'the delicate noses' of ladies as much as did the condensation from gas burning at the Lyceum, a condensate which caused ladies' furs to look bedraggled.

Although Clegg was an independent discoverer of the virtues of lime purification of gas, other workers seem to have arrived at this treatment in the first decade of the 19th century.

Thus William Henry referred to lime in a paper in the Philosophical Transactions in 1808, while Winsor also used the agent. As yet another alternative to using lime in a separate purifier was the scheme for adding lime along with the coal in the retort.

Two years after the work at Stonyhurst College Clegg moved to London, which gave him more publicity than he would have derived from staying at Soho. In 1814 he became engineer to the 'G.L.C.' at a salary of £500 a year.

He lighted the shop of the publisher, Ackermann, on the Strand. A Science Museum illustration shows this achievement. Ackermann seems to have been more than a publisher in business outlook, for he sold the tar, coke and liquor from his Strand plant as a side-line.

Charcoal ousted

Not only was gas found advantageous for lighting his premises, but 16 cockspur burners were used in place of charcoal heating for the printers' plates.

The first gas burners were of the rat-tail type, a cockspur introduced in 1808 being three grouped rat-tails.

Following a cockscomb of nine rat-tails came Clegg's introduction of a type of Argand burner, a modification of the oil-burner of the Swiss Doctor Argand.

Argand came on a visit to England and met Boulton and Watt, who also adopted his idea; yet although by 1815 some 4,000 Argand burners were in use and more than 50,000 by 1819, Argand died in poverty.

Their heyday

In 1816 the batswing came into fashion, while four years later the fish-tail proved yet another variation, all having their heyday until Welsbach's gas mantle banished them.

Meanwhile Clegg was proving his powers as engineer with more to his score than Murdoch. We hear of Clegg at the Westminster gasworks getting much better yields of gas than Murdoch was obtaining.

On Westminster Bridge the first street lamps were appearing, this despite the opposition of lamp-lighters, who were afraid to go near such lamps lest they should be blown up.

Clegg went round himself with a ladder to prove them harmless.

Lost fortune

But above all was the inventive genius of Clegg in his London period before he lost fortune at Liverpool and turned later to other forms of engineering.

He introduced the gas meter, a pilot or basis for subsequent meters for decades to come. Clegg saw the disadvantages of paying for gas used on a time basis; hence he made many attemps to devise a dry meter until he had to be satisfied with a water-type meter.

He invented the self-acting governo

Continued on page 27

New type refrigeration drying plant at East Perth, Australia

THE dehydration of town gas before distribution has been practised for many years at a number of gasworks in Australia. A number of these have utilised calcium chloride as the drying agent, but plant of this type has certain disadvantages if atmospheric temperatures are high and fluctuate sharply throughout the 24 hours of the day.

Under these conditions, a good case can be made for reducing the dew point of the gas by direct contact with refrigerated water. By this means, dew points of 36-38°F. can be maintained at all times of the year.

A number of installations of this type are already in operation in Australia.

A disadvantage of this system is that the chilled water is an intermediary between the ammonia in the refrigerator evaporator and the gas, resulting in greater cost of the plant, higher running costs and additional thermal losses.

DIRECT CONTACT

This disadvantage can, however, be minimised if the gas is cooled by direct contact with the coils of the refrigerator evaporator, as the heat abstracted from the gas is then taken directly into the boiling liquid ammonia.

The first plant of this type to be installed in Australia was started up at the East Perth gasworks in July 1959.

This works is operated by the State Electricity Commission of Western Australia.

This plant, which was designed by Woodall-Duckham, Australia, in conjunction with W. C. Holmes & Co. Ltd. and the refrigeration engineers, Gordon Brothers Ltd., Australia, handles two independent low pressure gas streams, each of 4 mill. cu.ft. per day.

During the summer, gas may enter the plant at 100°F. saturated, while at other times of the year the gas temperature is about 70°F.

COOLING TOWERS

As a limited amount of borehole water at 70°F. is available, direct contact cooling towers are fitted by which the gas is first cooled to between 85°F. and 90°F.

The gas then flows through a gas/gas heat exchanger where it is further cooled to about 75°F. by heat exchange with cold gas leaving the refrigerator section.

The gas is finally cooled to its required dew point temperature by passing through the final cooler. This is of tunnel form and is fitted with finned cooling coils arranged across the gas stream.

These coils are the ammonia evaporator section of the refrigerator, and the gas passing over them is cooled to 35°F.; water vapour is condensed and the gas leaves with a dew point of 35°F.

The dried gas, after passing through the gas/gas heat exchanger, has its temperature raised to about 75°F. at the outlet of the plant.

Condensate comprising water and a certain amount of light oils is deposited from the gas in the various cooling vessels; this leaves each vessel through standard seals.

Each gas stream has a single refrigerator, each of which is served by three electric motor-driven 16-ton ammonia compressors.

Overall control of the plant is obtained from the temperature of the gas at the outlet of the final cooler. A controller maintains the ammonia in the evaporator at a pressure equivalent to a temperature of 30°F.

6-STEP CONTROLLER

The operation of the ammonia compressors is governed by a six-step controller which stops or starts individual compressors or unloads certain compressor cylinders so that the power demands of the refrigerator follow closely the thermal requirements of the plant.

A complete set of recording instruments and the usual refrigerator indicators and alarms are installed.

Following a short settling down period after the initial start-up, the plant has worked steadily ever since.

It has proved to be stable in holding the gas dew points to the required figure and has been surprisingly tolerant of very rapid alterations in the gas volume loading such as occur when a c.w.g. plant is put to work.

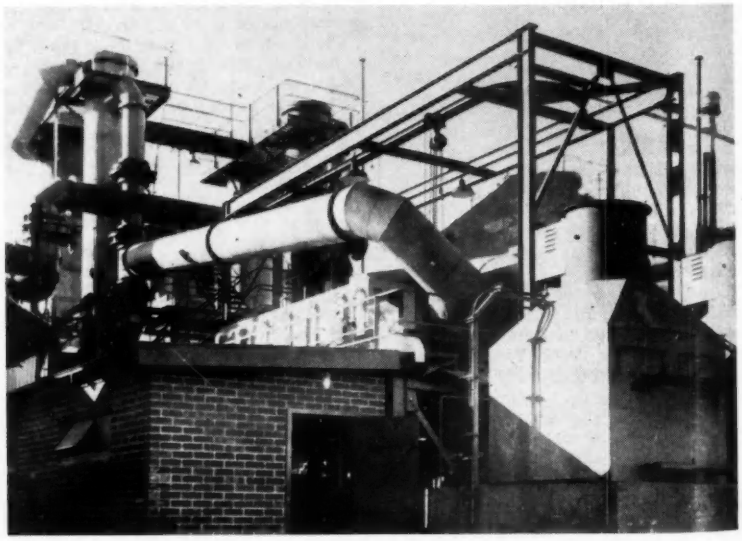
SLOW BUILD-UP

In practice there is a slow build-up of ice on the evaporator coils which results in a slow increase in back pressure in the gas stream.

This is dealt with by raising the refrigerator evaporator temperature from time to time and re-setting it back to normal when the cooled gas temperature begins to rise.

The back pressure at the design gas flow is about 3 in. c.w.g.

WHAT THE PLANT IS LIKE



The refrigerant gas dehydration plant at the East Perth gasworks, showing the atmospheric ammonia refrigerant coolers in the foreground, the refrigerant gas cooling tunnels on the roof and the gas/gas heat exchangers and gas direct contact cooling towers in the background. The control room is shown on the left and the ammonia compressors are located at ground level beneath the gas cooling tunnels.

From a paper to the Yorkshire Junior Gas Association.

Some experiences with P.F.D. on C.W.G. plant

ASSISTANT WORKS MANAGER,
BIRKSHALL GASWORKS, BRADFORD,
NORTH EASTERN GAS BOARD.

By G. WAITE

SINCE vesting day, the gradual increase in the cost of feedstock for c.w.g. manufacture has caused concern as to the probable future of this type of plant. Its use generally has been limited to peak load output, but the trend in the coke market, allied with the concentration of the gas manufacture on fewer, but larger, works, has necessitated a heavier c.w.g. load. The rapid development of the diesel oil industry over the last few years has accelerated investigations into the possible substitution of gas oil with some cheaper and more plentiful feedstock, to allow this policy to be pursued. P.f.d. immediately suggested itself, since it satisfied both requirements, and the North Eastern Gas Board decided to convert plants on their larger works to its use.

Primary flash distillate—light distillate feedstock or motor spirit ether—is light hydrocarbon feedstock taken from the surplus petrol fraction. In effect, p.f.d. is the first condensable fraction after the still gases.

TABLE 1

Constituent	Gas oil	P.f.d.
	%	%
Olefines	1·9	—
Paraffins	72·6	75—80
Aromatics	14·3	20
Naphthenes	11·2	—
C.V.	19,260 B.t.u./lb.	20,000 B.t.u./lb.
Specific gravity	·825	·645/·730

The distillation range of p.f.d. is 50% at 97°C.; 95% at 148°C., and the end point, 164°C. Other characteristics are: The Reid vapour pressure, 12.9 p.s.i.; the sulphur content varying between .03% and a maximum of .15%; a thermal content of 1.42 therms per gal., and a C:H ratio of a minimum of 5 and a maximum of 6.

Before proceeding with the conversion of the c.w.g. plant from gas oil to p.f.d. for enriching, notification was given and close liaison sought with the oil company which was to supply the p.f.d.—Shell-Mex and B.P. Ltd.—the plant manufacturers—Humphreys & Glasgow Ltd. and the Power Gas Corporation—H.M. Factory Inspectorate (Works, Alkaline and Electrical), H.M. Customs and Excise, local authorities, and the National Fire Service.

All aspects of the scheme were considered, and general agreement reached regarding details of layout; these were approved by H.M. Factory Inspectorate, and Customs and Excise who were very appreciative of being consulted and indeed were very helpful. Representatives of the Customs and Excise and the local N.F.S. visited the works for consultation and inspection purposes.

On the recommendation of the Chief of the N.F.S., the local authority readily issued the necessary licence to store petroleum. Since the completion of the installation, the local fire service personnel have instructed all sections, by visits to the site, on how to deal with fire, and store several hundred gal. of foam on the works for convenience.

The c.w.g. plant at Birkshall consists of four units, details of which are shown in Table 2.

In Nos. 1, 2 and 3 machines the carburettors and superheaters are chequered, but in the No. 4 machine, the generator is self-clinkering, with an annular jacket boiler and a Lynn-Rambush grate. The carburettor is of the ignition dome type, with opposed oil injection and is chequerless. The superheater is chequered, and the control valves are automatically hydraulically operated. The gas streams of the four sets are common, and it is therefore not possible to obtain the gas production figures of any one set, unless the other three sets are standing.

On sets Nos. 1, 2 and 3 (Humphreys & Glasgow Ltd.) the existing cyclic oil valve was removed, and the operating lever brought above the floor where a new p.f.d. cyclic valve was fitted. A steam purge valve was also connected to the oil valve lever which opens when the p.f.d. is off, to protect the jet. New types of jet were fitted originally to deal with the p.f.d., but were later removed and the old type jets refitted. On these sets the oil for reforming is admitted at the top of the carburettor at exactly the same point as the enriching oil, and therefore the cyclic valve sufficed for both operations. An additional cam has been fitted on the auto operator which operates an electric switch to a magnetic valve in the main set delivery line. This is the interrupter valve which closes for three seconds and shuts off the p.f.d. while the changeover from uprun

TABLE 2

Machine No.	Nominal capacity mill. cu. ft. per day	Maker	Operation	Generator	
				Diameter	Clinkering
1	1·2	Humphreys & Glasgow Ltd.	Mechanical	5 ft. 5 in.	Hand
2	1·2	,,	,,	5 ft. 5 in.	,,
3	1·5	,,	,,	6 ft. 4 in.	,,
4	2·5	Power Gas Corp.	Hydraulic	8 ft. 6 in.	Automatic

to backrun is taking place, to prevent the two pressure surges occurring together.

On the No. 4 set (Power Gas), a new cyclic oil valve, complete with steam purge and steam bypass direct to the oil jet, was fitted next to the carburettor, and one at the superheater top. On this set, the enriching oil is injected at the carburettor base, as it was for gas oil, but the reformed oil is injected at the superheater-top, therefore requiring two separate feed lines to the set. A new cam was fitted to the Auto operator to control this reforming oil valve. The jets are water cooled.

Steam valves

An extra process steam valve was also fitted so that, when the reforming oil valve shuts, additional steam is added to clear the vessels of oil gas before the blow starts. Charging of the generator with coke has been changed to take place during the blow, so that the whole of the back run may be used for reforming.

P.f.d. is branched off to the Nos. 1, 2 and 3 sets from the main feed line, through an Audco valve to the Flowrater indicator and recorder, which is calibrated in gal. per minute, then branches out into two separate lines each fitted with an Audco control valve. The top line is the enriching feed, and the bottom line the reforming feed. An electric switch from the Auto, operating from the backrun levers, opens a magnetic valve in the reforming feed line during the backrun and allows p.f.d. to byepass the enriching line control valve, thus admitting more oil during reforming.

From the main feed line on the No. 4 set p.f.d. passes through an Audco stop valve, a Flowrater indicator recorder, a magnetic valve, and then splits into two separate lines, each fitted with Audco control valves. One line is the enriching line to the carburettor, the other the reforming line to the superheater. At the points of entry of all sets a steam purge valve is fitted on the set side of the Audco stop valve to allow steam purging of all p.f.d. lines inside the c.w.g. building before and after each shut down.

Storage tanks

It was anticipated from figures available that something in the order of 3 to 4 gal. p.f.d. per 1,000 cu.ft. of gas made would be required, and therefore with a maximum plant output of 6.4 mill. cu.ft. per day, equivalent to 19,000 to 24,000 gal. p.f.d., arrangements were made for a storage capacity of 96,000 gal., in the form of eight 12,000-gal. horizontal storage tanks. These tanks are carried on concrete cradles, and are interconnected by 6-in. pipes from the off-loading pump and 3-in. pipes to the set transfer pumps. At the request of H.M. Customs and Excise, great care was taken in ensuring that the tanks were laid level and uniformly supported to facilitate accurate dip readings. The connections are valved at each tank, and the operating spindles are raised to allow valve operation above tank level. Each tank has a water drain which is blanked-off and locked. The tanks are contained in a brick bund, which is 110% capacity, and are surmounted by a timber walkway allowing easy access for dipping. Each tank has a captive dip stick and there is a connection from the inlet holder gas main to keep the p.f.d. under pressure (10-14 in. w.g.). This is to prevent loss to atmosphere due to evaporation, and also air ingress on cooling or when the sets are being fed. P.f.d. is delivered by rail in 4,000-gal. tanks, but road unloading facilities are available, if required. The rail tanks arrive sealed, and can only be unloaded from a top dip pipe which is connected by a flexible hose to the unloading manifold, and then through a 6-in. pipe directly to the off-loading pump, discharging into the bottom of all tanks, which are inter-connected. The storage tanks and pipes are all electrically bonded to a common earth plate, and an earthing switch is clamped on to the oil tanks when unloading takes place. Two large, portable foam fire extinguishers are kept nearby, and the local fire service have foam material stored permanently on the site. 'No Smoking' and 'No Naked Lights' notices are posted over the area. The p.f.d. stock is maintained at a maximum of 80,000 gal., and material ordered to cover the estimated week's consumption.

Stocks of gas oil have been retained at the works, and the necessary connections to revert to gas production by use of gas oil are such that reversion can be undertaken in a matter of an hour or so in emergency. In order to satisfy H.M. Customs and Excise, special make-up connections in the oil pipe line have to be inserted since normally the break in p.f.d. and gas oil pipes is complete.

The p.f.d. is drawn from the bottom of the tanks by three electrically driven rotary pumps, two of which can supply the four c.w.g. sets with sufficient p.f.d. when enriching and reforming at 80 p.s.i. There is a strainer on the section of each pump and a non-return valve on the outlets. A connection from the pump outlets with a small orifice in it allows a continuous bleed back into the p.f.d. storage tanks so that when the sets cease taking, the pumps will not overheat by churning the same oil round.

Magnetic valve

The high pressure line to the sets has a magnetic valve near the pumps that can be operated from the top of the c.w.g. sets and from the pumping compound. This valve is linked with the pump motor starters, and if it is closed the pumps are automatically stopped and the sets isolated from the supply. Since it is possible to close valves at either end of the pipeline with p.f.d. still in it, a relief valve is fitted directly after the magnetic valve, and is set to return p.f.d. back to the storage tanks at 100 p.s.i.

The pipeline, of all-welded construction, is on the outside of the c.w.g. house and has a gradual fall-back to the storage tanks. The Power Gas set takes its supply first though a tee piece in the line to an Audco cock, and then a magnetic valve which can be closed from the plant messroom. The p.f.d. is filtered before metering, and that to the three Humphreys & Glasgow sets passes through a single filter and magnetic valve which can be operated away from the sets. Any set can be isolated in emergency by means of magnetic valves. All pipe lines are fitted with steam purging points. The connections, pipes and pumps are inspected every shift for leaks, and this is recorded in the shift engineer's book.

All p.f.d. valves are manufactured by Audley Engineering Co. Ltd. Those outside the building are their normal cast steel cocks, and all inside the building, including the cyclic valves, are of the Hyperseal type. All the valves other than the cyclic valves have been satisfactory. These cyclic valves leaked at the steam gland after continuous use, and several types of gland or steam packings were tried before a successful seal was obtained. The valve makers were very helpful, and their finally recommended fibre loaded packing has been used quite satisfactorily over the past two years.

Naphthalene was produced when gas oil was used for c.w.g. manufacture, and the analysis of the c.w.g. tar showed a naphthalene content of 3%. It is interesting to note, however, that tar distillers rarely obtained naphthalene from this source, the difficulty being that the tar

contained paraffinoid bodies of similar boiling points. These similar boiling point bodies in effect, acted as a solvent and thus prevented the deposition of the naphthalene. With p.f.d. little tar is produced.

When the sets were first changed over to p.f.d., the cycles and temperature in superheater and carburettor were kept the same as those used for gas oil. The mains, washboxes and condensers were coated with tar from the gas oil, and apparently this tar absorbed all the naphthalene produced for the first week or so. After this, however, the naphthalene content began to rise to a figure of approximately 70 grains per 100 cu.ft.

High oil rate

In an attempt to check this, the oil was injected at a higher rate for a short period to give a minimum contact time in carburettor and superheater. This had the effect of undercracking the oil and reducing the naphthalene figure, but the high oil rate gave rise to pressure conditions on the sets which meant lowering steam rates to compensate, and therefore a lower set efficiency. The oiling rate was brought back to normal, and high uprun steam rates introduced to observe whether or not some 'masking' effect could be achieved, but again set pressures were the limiting factor. It was finally decided that set temperatures would be gradually reduced, until naphthalene formation was at nil to investigate the effect on set output. The optimum cracking temperature varied in each set, but these temperatures were found experimentally and maintained. Initially, the specific gravity of the p.f.d. was .67, and the reduction in carburettor temperature to prevent naphthalene formation was most marked, a drop of some 200°F. from that required when enriching with gas oil. At this low carburettor temperature there was difficulty in balancing the secondary air input, but by bringing the secondary air in very late and just at the end of the blow, satisfactory conditions were achieved. From Table 3 it can be seen that, if the naphthalene content could be kept below 6 grains per 100 cu.ft. at the washbox, no difficulty would be experienced by deposition at later stages of the plant. When using the normal gasworks test for naphthalene, it was realised that other unsaturated hydrocarbons would be determined as naphthalene and give a false final figure. These were compounds that did not form crystals and were of no detriment to the town gas. The following method of testing was then used:—

The gas is bubbled at the rate of 1 cu.ft. per hour into a picric acid solution, utilising two Dreschel bottles. The precipitate is collected, using a sintered glass Buchner funnel and washed with a little picric acid; it is then dissolved in chloroform and made up to a known volume. One half of the solution is taken, water added, and is titrated against N/10 NaOH using phenolphthalene as the indicator.

$$\text{Result A} = \text{total naphthalene} + \text{unsaturated hydrocarbons}/2.$$

The other half is shaken with 10 ml. of Wij's solution, and allowed to stand for the prescribed time of three minutes. Potassium iodide solution is added and the liberated iodine is titrated against N/10 sodium thiosulphate. A blank determination is made on an equivalent amount of chloroform.

$$\text{Result B} = \text{unsaturated hydrocarbons}/2\text{—plus any slip naphthalene. Thus } 2\,(\text{A—B}) = \text{naphthalene from sample of gas.}$$

The test must be carried out with a good purge of gas, and the sample lines lagged. The figure specified, namely 6 grains per 100 cu.ft., was quite easily maintained, the difficulty being to watch out for signs of undercracking as the specific gravity of the oil increased. A rule of thumb method was adopted that with a low naphthalene figure the condenser seal pots should be free of oily discoloration. If the oily surface persisted, by gradually increasing the carburettor base temperatures until it disappeared the set was once again brought to its optimum temperature. It was soon noted that the temperature increase or decrease requirements followed a very steady line with the increase or decrease of the specific gravity of the oil. In fact the line was so similar that the specific gravity of the oil was taken as the standard method of temperature adjustment, and for about 18 months this method worked very well. During the past year, however, this has not been so. Recently, specific gravity alterations have borne no relationship whatsoever to the cracking temperatures required, and so it has been necessary to revert to the previous method of daily washbox tests to determine set conditions. No explanation has been forthcoming, and it can only be suggested that the reason is the original treatment of the crude oil fractions. The only differences, apart from specific gravity, in characteristics are (a) the colour, varying from white to yellow, and (b) the smell—the yellow being most pungent.

The enriched and reformed gas combined contained from 50 to 70 grains per 100 cu.ft. of naphthalene and was heavily loaded with carbon black or soot. In this case, the reduction of set temperatures was not practical, because during enriching only the carburettor and superheater temperatures have to be considered, but when reforming, the generator temperature also plays its part. Reduction in set temperatures throughout led to a definite cooling-off of the generator top which resulted in failure to 'light off' in the carburettor during the blow. Any attempt to work with a low generator temperature and high carburettor temperature to balance the cracking during reforming only led to the production of naphthalene during enriching, and so another method of control was sought. By manipulation of the oil rate, steam rates and the generator temperature the figure was finally reduced to 25 grains per 100 cu.ft., but at this figure 35 lb. of naphthalene per mill. cu.ft. of gas produced was deposited in the mains and condensers, and consideration was given to discontinuing reforming and concentrating on enriching only.

Wear and tear

Heavy naphthalene and carbon black sludge was now being formed at the condensers and detarrers, and attempts were made to prevent carbon formation by (a) increasing and (b) decreasing the generator temperatures. Increasing the generator temperatures on the M. & G. sets proved to be the answer, but the wear and tear on linings and clinkering doors led to its abandonment. It was finally decided to discontinue reforming until sufficient information was available on 'enriching only' output.

As already stated, with a p.f.d. of specific gravity of .67 the heat requirement for cracking was some 200°F. below gas oil cracking temperatures. This reduction was not so marked as the specific gravity increased, but even at the highest specific gravity of .7130 the temperature required was still not as high as for gas oil. It was clearly possible therefore to utilise this reduction in heat requirement for plant output purposes. The two methods tried were (a) the maintenance of the cycle, but increased steam and oil rates, and (b) the reduction of blow to a minimum consistent with keeping the generator hot enough to make blue water gas. The use of the former led to pressures

developing in the set, and therefore the latter was pursued.

When using gas oil, the sets' nominal outputs were always difficult to attain, but with the alteration in cycle the output when enriching only, has increased above the nominal by up to 10%, depending on the specific gravity of the p.f.d. This has meant that previously a maximum output of only just 6.4 mill. per day has been increased to 7 mill. cu.ft. per day, which is the maximum our condensing plant at the moment is capable of handling. At Birkshall then the need for 'reforming' clearly does not arise, and its attendant troubles are therefore avoided. Apart from p.f.d., the normal cyclic alterations caused by changes in coke quality and ash fusion points, are still necessary.

Intermittent periods

Variations in specific gravity, delays in testing gas and stoppages caused by mechanical faults have been responsible for intermittent periods during which naphthalene has been produced. In the first 12 months of working, any deposit that came down in the seal pots was easily removed either by the addition of Solvit (a product of the Manchester Paint and Varnish Co. Ltd.), the addition of heat in the form of steam, or both. These treatments usually cleared any run-off obstructions but, after about a year, pressure increases across the condensers were noticed which adversely affected the set efficiencies. By working to a higher outlet temperature—about 100°F.—this build-up was either removed or reduced.

If, however, it persisted, taking the condensers out of line, spraying Solvit into the gas side and steaming cleared the blockage. In co-operation with the wash-box testing, this method was normally sufficient to keep conditions on the plant good. However, about three months after the specific gravity of the p.f.d. and cracking temperature lines differed, a different and far more serious problem developed.

Pressure troubles had been developing on the sets, primarily across the condensers, and the usual treatment of heat and Solvit had virtually no effect. On taking the condensers out of line and examining the gas side, it was found that a hard, pitchy, glass-like deposit had built up around the tubes blocking the gas way.

Distillation test

This deposit was carefully examined and underwent a distillation test. At 60°C. the substance began to soften, at 90°C., separate lumps fused together, becoming slightly viscous, while naphthalene and low volatile aromatics were given off. At 100°C., it became more viscous and the light oils distilled off, though at 110°C. there was no change, other than increased fluidity. Between 160° and 200°C. the substance began to break down and gases were evolved. Between 200° and 300°C. fluidity continued to increase and went on doing so up to 340°C. At 360°C. the final stages in distillation were reached with the remainder volatile matter evolved, leaving at carbon residue at 410°C.

At 110°C. the volume of the sample fell to one-fifth of its original size.

Direct heat in the form of steam should, therefore, have a softening effect, and, though the process might be slow, the condenser should clear.

Emptying the condensers of water and applying steam to both the gas and water side caused the pitch to flow around the tubes, and form an addition to the solid mass already at the base of the tubes. To remove this heavy, thick mass substantial quantities of heat would be required, so the base of the condenser was lagged, the run-off lagged, and steam was blown in at several points round the mass. Several hundredweights of pitch eventually flowed from the condenser to form this glass-like deposit as it cooled again outside. Some quicker, and more efficient, method was, however, required for its total removal. This applied to the Power Gas condenser, which being of the baffle type and of first class design for efficient cooling, was the most susceptible to blockages of this nature. The Yorkshire Tar Distillers were consulted and, after examining the pitch, suggested that home trade creosote at boiling point would probably help. After laboratory testing with first class results, this creosote was circulated around the condensers on the gas side while steam was kept on the water side. The creosote successfully absorbed up to 80% of the pitch before its own fluidity, at 100°C., was substantially affected. The cost of the creosote was 1s. 5d. per gal., and it could be resold after mixing with tar. The procedure is now adopted as standard at Birkshall.

The use of p.f.d. had certain effects on the ancillary plant.

The non-production of tar in quantity causes acidity to develop more rapidly in the relief holders. When using gas oil the condensed tar in the holder gave a surface which was non-conducive to the absorption of H_2S. The absence of this surface film allows a rapid absorption of H_2S and oxides of sulphur, giving rise to acidic conditions which the small amount of NH_3 produced will not neutralise. This acidity can cause corrosion troubles in the holder lifts, again due to the absence of the tar coating on the metal. It is advisable, therefore, regularly to test the *p*H and regulate to neutral by the addition of a strong sodium carbonate or caustic soda solution to the holder water.

Easily removed

In the detarrers, exhausters and outlet mains there has generally been no difference noted other than a soft, oily, naphthalene-type deposit in the mains and plant up to the inlet purifiers. This has occasionally led to seal pot runs-off blocking, but this has been of no moment and can be easily removed.

The H_2S content of the p.f.d.-enriched gas is 110 to 150 grains per 100 cu.ft.—enrichment only—as against 230 grains per 100 cu.ft. when gas oil is used; initially there was no difference in the operation of the c.w.g. purifiers. Since the trouble with naphthalene deposits, the rise in the outlet condenser temperature has led to an increase in the purifier inlet temperature with, consequently, a greater temperature drop across the boxes. This has led to condensation of some of the hydrocarbons on the oxide surface, which has increased with the production of a high c.v. gas. Because of this the oxide is now developing a tendency to sludge which not only creates pressure difficulties but also retards the revivification of the oxide. The normal crushing of the oxide after discharge tends to break down the sludge to a certain extent, but it would appear that after prolonged working of three to four years, there will be a c.w.g. oxide disposal problem.

When using gas oil the condensation from the c.w.g. purifier was run direct into the works main tar and liquor well. There were no apparent difficulties from this procedure and these connections remained after the change to p.f.d. Some six months after the introduction of p.f.d., difficulties appeared from the formation of tar and liquor emulsions, and also from the discoloration of the coal gas liquor. Other causes than the use of p.f.d. were investigated unsuccessfully, and eventually c.w.g. purifier condensate was suspected. Clean, clear coal gas liquor was filtered and varying amounts of c.w.g. purifier condensate

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added to 2,000c.c. samples. There was immediate discoloration of the liquor; even when the concentration was as low as 1 c.c. in 2,000 c.c. the dark discoloration was permanent. The condensate was therefore re-routed to a syphon oil settling tank, and the discoloration of the liquor in the main well gradually disappeared.

During the summer of 1959, the calorific value of the gas at the inlet of the holder and the town gas varied by about 10 B.t.u. per cu.ft. Various tests were carried out, but the difference was positive. At the time of the discrepancy, a low specific gravity p.f.d. was being used, and a high c.v. gas was being produced. The cracking temperatures in the c.w.g. plant to obtain the minimum formation of naphthalene were low and conditions were ideal for a 'slip' of uncracked hydrocarbons. The c.v. of the gas was reduced and the maximum amount of 'cracking' time given to the p.f.d.; this resulted in the deficiency falling to approximately 3 B.t.u. per cu.ft. Uncracked hydrocarbons, or the 'heavy ends,' seemed to be condensing out in the holder, so a sample of condensate from inside the holder tank was analysed, but it is difficult to say how much of this condensate is due to p.f.d. and how much was from the gas oil.

There was still the discrepancy of 2 to 3 B.t.u. per cu.ft., and this was blamed on the condensing of hydrocarbons. Since then, however, the freezing and analysis of the condensate have shown that p.f.d., as such, is present in the gas stream, and in effect there is 'cold enrichment' taking place. This p.f.d. will tend to condense out on cooling or compression. The maximum permissible concentrations of the components of p.f.d. in the vapour phase at various temperatures are shown in Table 3.

TABLE 3

Component	% by volume				
	0°C.	5°C.	10°C.	15°C.	20°C.
C_5 n–Pentane ..	7·20	—	—	—	—
C_6 n–Hexane ..	5·9	7·7	9·7	13·3	—
C_7 n–Heptane ..	1·5	2·0	2·6	3·6	4·7
C_8 n–Octane ..	0·4	0·55	0·75	1·0	1·4
C_9 n–Nonane ..	0·1	0·2	0·3	0·4	0·5
C_{10} n–Decane ..	0·02	0·03	0·08	0·15	0·2

If the reductions in volumes shown in this table are taken as a percentage of the original the greatest fall-out appears in the 'top fractions,' or 'heavy ends.' High c.v. production would tend to create conditions under which uncracked p.f.d. passing forward would contain a higher percentage of 'heavy ends'; this would make the production of gas of high c.v. wasteful.

Valve problem

After valves had been closed and allowed to go cold, it was only with the greatest difficulty that they were opened again. There were two reasons for this:

1. The non-production of tar with the consequent drying-out of the valves.

2. The deposition of pitch on the valve faces and seats which, when allowed to cool during shutdowns, hardened and fastened the valve in whatever position it had been left. Steam jets into the valve to soften the pitch was the only safe remedy.

The rail tanks are unloaded by means of a dip pipe from the base of the tank. In winter, any water separating out of the p.f.d. sinks and freezes, preventing emptying. A steam supply has therefore to be used during off-loading. Similarly, at the steam purge junctions on the p.f.d. line, condensed steam freezes since the p.f.d. may be delivered at the sets at below 0°C. This is obviated by lagging the steampipes and trap lines.

Compared to that from the use of gas oil, the effluent problem is small because there is virtually no production of tar, but the slightest undercracking produces not just a surface oil but an oil containing some naphthalene and some carbon particles. Combined with this, there is sludge deposit that may occasionally come out at the condenser, and together they constitute a surface covering which, although small in volume, has an extremely pungent smell. Its discharge could cause some embarrassment, not only because of the obnoxious smell but also because of its similarity to coal gas leakage even when diluted. Some method of breaking down the surface must be used, and we find that sprinkling Bitran C.W. (Glovers Chemicals Ltd.) on the surface breaks down the formation and the sludge sinks into the traces of tar in the separator base.

Relining

When using gas oil in the Humphreys & Glasgow sets relining of the generator, carburettor and superheater was carried out after a production of 80 mill. cu.ft. of gas. The condition of the brickwork was usually as follows:

1.—The generator—well burned back and in definite need of renewal.

2.—The carburettor—the lining was usually burned back and had a definite 'carbon crazed' appearance. The chequer brickwork had usually collapsed from what appeared to be a combination of hot spot fusing and 'carbon crazing' followed by surface splitting.

3.—The superheater—generally, the same conditions as the carburettor, but to a lesser degree.

Since the introduction of p.f.d., however, the sets have made up to 110 mill. cu.ft. of gas before relining, and the condition has been as follows:

1. The generator—from 3 ft. above the clinkering door upwards there is little sign of wear, but from 3 ft. down the wear appears to be equivalent to that of the set after the production of 80 mill. cu.ft. of gas enriched by gas oil.

2. The carburettor—the lining is worn back, but not to the same degree as when using gas oil, and there is a complete absence of carbon surface splits. The chequer brickwork apart from some local fusing was in first class condition, and did not require changing.

3. The superheater—both the lining and the chequer work were in first class condition.

Brickwork life

The reasons for this increase in brickwork life are attributed to (a) a lower generator temperature, (b) a shorter blast period, and therefore less fluctuation of the temperature range, and (c) the lower carburettor and superheater temperatures. It would appear from this that a production figure of 110 mill. cu.ft. is about the maximum which may be worked to with safety, since at this point the generator base is in need of attention. However, because of the light wear and tear of the carburettor and superheater, the shut-down time for relining is greatly reduced.

Large coke—(c.v.r.)—*i.e.*, 1¼ in., is used for all sets. The coke consumption per 1,000 cu.ft. of gas made when enriching by p.f.d. and reforming, is 18 to 20 lb. but when enriching only, it varies between 27 and 29 lb. per 1,000 cu.ft. made.

The complete analysis of the gas shows how the percentage composition of the paraffin hydrocarbons altered; it ranged from methane CH_4 to pentane C_5H_{12}. With a

higher proportion of methane, the naphthalene content of the gas was also high. Ethane and propane were the major constituents of the paraffins, their volumes ranging from 3% to 7%. Up to 2% pentane, or a mixture of hydrocarbons approximately to C_5 with a calorific value of 4,016 B.t.u. per cu.ft., is commonly present. When enriching and reforming the hydrogen content of the gas rises to about 45% with a reduction in the specific gravity. The analyses of the various gases are shown in Table 4.

TABLE 4

Constituent	Enriched gas only	Enriching and reforming	Reforming only
CO_2	5·4	4·2	2·9
CnHm ..	5·9	6·1	2·6
O_2	·4	·5	·1
CO	30·8	29·7	17·8
H_2	43·4	45·3	63·6
C_2H_6	4·2	·5	—
CH_4	1·2	8·7	12·2
N_2	7·4	5·0	·8
S.G.	·64	·59	·4
C.V.	510	501	446

Only a trace of tar is made, and since starting up 5.469 mill. gal. of p.f.d. have been used, and only 13,000 gal. of tar made. This represents a tar make of .24% v/v on fuel used.

Thermal input

Since it is not possible when reforming to differentiate between the amount of CO and H_2 produced in respect of p.f.d. and coke reactions, and the standard formula for estimating therms per gallon can no longer apply, it was agreed from observation and comparison that 95% of the thermal input of oil must be regarded as recovered in gaseous form. This is based on the assumption that the amount of soot, naphthalene, or tar formed is negligible. The 95% thermal input from oil is, therefore, subtracted from the total, giving therms recovered from the coke/steam reaction. For similar reasons the same figure 95% of the thermal input is used for calculations when enriching only.

Recently, difficulties in plant operation have made it necessary to work one c.w.g. set at temperatures well below the normal accepted cracking point. Previously when this occurred the hydrocarbons coming down in the condenser slowly washed out any naphthalene sludge into the seal pots and any blockages arising from it were easily broken down.

On this occasion, however, the sludge formed, though appearing to be a normal naphthalene type, had a definite pitch content, and was more tightly bonded than usual. Difficulty was experienced in removing the sludge and where possible mechanical means were used. At this cracking temperature and with the oil:steam ratio at its normal setting, it was surprising that there should be any pitch present, and so the back-run gases were tested for signs of soot.

This condition can arise if the p.f.d. has not been swept clear of the carburettor during enriching and is driven into the generator during the back-run. No soot or carbon was found. The p.f.d. was from a different refinery and was of a higher specific gravity than we had previously encountered, namely .72.

The 'washing out' of deposits continued and even though the temperatures were raised to normal it persisted even as far as the inlet purifiers. Apart from the difficulties at the various seal pots, it was obvious that if this 'washing out' continued at the purifier inlet, the sludging of the oxide would be accelerated. Pressure built-up across the purifiers indicated that this was happening.

A comparison between the two consignments of p.f.d. are shown in Table 5, and it was immediately apparent

TABLE 5

P.f.d. analysis by chromatography

Component	Sp. Gr. ·68	Sp. Gr. ·72
	% w/w	% w/w
Paraffins		
C_5	32·5	14·8
C_6	38·2	13·3
C_7	19·9	16·4
C_8	4·6	13·3
C_9	—	17·6
C_{10}	—	19·9
C_{11} and above	—	—
Naphthenes		
C_6	3·2	1·4
C_7	1·6	3·0
Benzene	—	·3
	100·0	100·0

that the oil companies in an effort to balance their p.f.d. and petrol markets, had widened the earlier p.f.d. range to include some of the petrol fraction. If loss of c.v. and oxide fouling is due to condensation of uncracked 'heavy ends' the position now was worse, and a new approach to p.f.d. cracking would have to be made. If a works carries out a policy of minimum naphthalene production, as Birkshall is doing, then the introducton of this heavier oil—the specific gravity can be increased to .73—will have the following effect:

1. A high percentage of uncracked 'heavy ends' will go forward in the gas stream, initially wash out all the previous deposits, and recondense causing embarrassment in the purifiers.
2. A loss of thermal efficiency.
3. Even when all the condensers, mains and other plant have been cleared of deposit, the 'heavy ends' themselves will condense.

Even though it may eventually happen that no deposit is left in the mains, which is obviously good from the plant operational point of view, the loss of these 'heavy ends'—$C_{8-9-10-11}$—must be obviated. The cracking temperatures in the carburettor would have to be raised with a consequent production of naphthalene to an extent of some 30 grains per 100 cu.ft., which would have to be removed by the installation of a naphthalene washing plant.

Pros and cons

Summarising, the experience gained by the operation of these plants on p.f.d., the advantages are:

1. The calorific value of the gas can be easily and quickly raised up to 600 B.t.u. per cu.ft.
2. The set output can be increased by up to 10% depending upon specific gravity and the feedstock.
3. In the event of breakdown, sets can quickly be put on to reforming and enriching, increasing the output by up to 30%.
4. No tar separation problems.

The disadvantages, however, are:

1. The control of naphthalene production is essential when a low specific gravity p.f.d. is used.
2. The formation of pitch.
3. The occurrence of cold enrichment with consequent loss of c.v.
4. When using high specific gravity p.f.d. (above .7), it would seem necessary to overcrack it to remove the heavier ends and wash for naphthalene.

NEWS SUPPLEMENT

NEAR 100 MAY BE PAID OFF BY MARCH END

BECAUSE of the decreasing demand for gas meters, the works of Alder & Mackay Ltd., at New Grange, Edinburgh, are to be closed and sold. Operations will be concentrated in the near-by works of Metal Units Ltd. Between 80 and 100 employees of United Gas Industries Ltd., are expected to be paid off by the end of March.

Since 1952 both Alder & Mackay and Metal Units have been subsidiaries of United Gas Industries Ltd.

Alder & Mackay, founded 110 years ago, was one of the five largest manufacturers of gas meters in the country.

The New Grange works of Alder & Mackay at present employs about 175 workers.

Motor bodies

About 60 may be paid off from there and perhaps 25 to 30 from the works of Metal Units, which specialise in radiator repairing and in motor body repair and repainting.

The latter side of the business will be discontinued.

'The parent board feel that the results do not justify the enormous amount of space and overheads involved,' said Mr. Stanley Bennet, a director of United Gas Industries.

The space made available will be used for the gas meter interests of Alder & Mackay.

Northern I.G.E. members visit Newalls

MEMBERS of the North of England Section of the Institution of Gas Engineers, on a visit to the factory of Newalls Insulation Co. Ltd. at Washington, Co. Durham, saw the latest processes in the production of thermal and acoustic insulation materials.

The visitors were subsequently given an account of the ever increasing importance of insulation in modern industry and also its impact on modern living and working conditions.

Tyne flat development incorporates gas

HEAT services in the first 12 of 19 blocks of multi-storeyed dwellings on Tyneside will be by gas. First stage of the development was marked by the recent opening of Heaton Park Flats by Newcastle Corporation.

This success story began with the Gateshead Corporation who, five years ago, selected gas for their Barns Close Flats. A complete service was provided and appliances installed included a Northern cooker, Ascot balanced flued water heater; Bamburgh convector gas fire, gas wash boiler and a Clifford clothes drying cabinet. Both the fire and water heater were individually flued.

The success of the Barns Close project, both from an operational and a running cost point of view, prompted Gateshead to incorporate gas in their Regents Court development.

Historical point

This has now passed into history as the first multi-storeyed dwelling to incorporate a SE-Duct.

The Newcastle flats incorporate SE-Ducts of No. 3 size.

There are four two-bedroomed and two one-bedroomed dwellings on each floor. Each flat will have fitted as standard, a Queenline gas cooker, a 727 balanced flue, multipoint Ascot water heater, a Walmer or Rado-Vecta radiant/convector fire, a Clifford clothes drying cabinet and an R.9 Dean wash boiler.

In addition one Caloric incinerator will be installed on the roof of each multi-storey block for the use of the caretaker for the disposal of waste.

The kitchen units presented a problem in the design stage, as a cooker was required of exactly 21-in. width, and which could be slotted into the cupboard layout.

Built to specification

Forth & Clyde, of Falkirk, undertook to manufacture this appliance to the specification of the Newcastle Corporation and have, in fact, done so within a period of 12 months.

Arrangements have also been completed with the manufacturers of Queenline kitchen furniture to enable an Electrolux M.B. 16 gas refrigerator to be installed in one of the fitted cupboards.

In the coastal area of the Tyneside Division an 11-storeyed block of flats is being constructed again incorporating SE-Ducts, with F.S.D. Halcyon warmed air heaters as standard fittings.

While not a multi-storey flat development, it is interesting to note that the South Shields Corporation are building 208 flats in three- or four-storey blocks, incorporating SE-Ducts. In addition to the cooker, drying cabinet, wash boiler and water heater, F.S.D. Halcyon heaters will be fitted as standard.

ELECTRICITY BOARD TO RAISE CHARGES

THE Central Electricity Generating Board announces an overall increase of approximately 2½% in the bulk supply tariff charges under which electricity is sold to the area boards, for the year beginning April 1.

The announcement — quoted by The Times—***says: 'The change will involve a 3½% increase on the normal fixed charge per kilowatt of maximum demand, raising it from 142s. to 147s., and a 2½% increase on the basic running charge, raising it from 0.41d. to 0.42d. a unit.***

'The increases are interim adjustments pending a comprehensive review of the structure of the tariff, which will aim at giving further encouragement to load factor improvement.'

NORTHERN FLATS

The first block of flats to be finished at Heaton Park, Newcastle-upon-Tyne, which was officially opened just before Christmas.

WILL THE SOUTHERN COUNTIES YIELD OIL AND NATURAL GAS?

PROSPECTING for oil and gas is possible soon in Hampshire, Surrey, Sussex and Kent, areas understood to have a similar geological structure to the Paris basin, in Northern France, which is a good oil prospecting region.

Esso Petroleum has applied to the Ministry of Power for licences and if these are granted a seismic survey will be conducted of the area before deciding on suitable sites for drilling.

Esso is no newcomer to oil exploration in Britain.

The company started drilling in 1936, and drilled a total of 16 wells, one in Fife, six in Midlothian, one in South Wales, one in Sussex, and seven in Nottinghamshire, says a *Financial Times* correspondent.

Only one of these wells, at Dalkeith, was successful, and it is still producing oil in small quantities.

The first sign of oil in South England was discovered in 1959 at Kimmeridge, Dorset.

Cleaning plant contract is worth £300,000

A CONTRACT for a blast furnace gas cleaning plant has been awarded to Lodge-Cottrell Ltd. by Dorman-Long (Steel) Ltd., for their No. 1 furnace at Clay Lane Ironworks. The approximate value of the contract is £300,000, and the plant will consist of two scrubber towers and three electro-filter units with H.T. transformer-rectifier equipment.

The plant is designed for cleaning 7.8 mill. cu.ft. per hour at N.T.P. from the furnace operating at 10 lb. per sq.in. and capable of withstanding a pressure of 25 lb. per sq.in.

Lodge-Cottrell will also be supplying Dorman Long with precipitators for Lackenby Steel Plant oxygen blown furnaces. The approximate value of this contract is £66,000. The plant consists of one four-stage horizontal-flow high-efficiency electro-filter together with all the necessary transformer-rectifier equipment, ventilation fan, drag link conveyors, rotary seal, and dust collecting and pelletising plant.

The chairman and committee of the Scarborough branch of the Women's Gas Federation entertained 50 members to a Christmas social evening in the Gas Showrooms, Westborough, and a number of them won prizes in various competitions.

GAS LEAK DANGER AVERTED

THOUSANDS of cubic feet of gas escaped when a fault developed on a water seal at the Milnsbridge gasworks in Huddersfield. Firemen wearing breathing apparatus entered the gas-filled building and poured water into the seal.

The leak was discovered by the caretaker at the plant who was awakened by the smell of gas. He could not get into the building because of the dense concentration of gas, and he called the fire brigade. Occupants of a house near the works were warned to prepare to leave because of the danger of explosion.

There had been a heavy draw on the works and this caused the valve to tilt, allowing the water from the seal to drain away.

B.I.M. will hold conference on foreman training

A ONE day conference on the subject of 'Foreman Training' is being organised by the British Institute of Management and Engineering. The conference will be held at the Connaught Rooms, London, W.C.2, on January 25.

The morning session which will be devoted to a 'National Approach to Foreman Training' will include papers on 'In-plant training,' 'External Training,' 'The Correlation of Foremanship and Management Training,' and discussion periods.

In the afternoon the conference will consider 'A Balance between Technical and Managerial Training,' and will hear papers on 'Technical Training' and 'Human Relations in Training.'

HOW THE I.G.E. FARED IN 1960

Continued from page 13

organised as was considered desirable and accordingly the Gas Education Committee appointed a sub-committee to make recommendations in this connection.

The sub-committee prepared a model scheme of practical training which was published as an appendix to the 37th Report of the Gas Education Committee.

Grants were made from the Woodall-Duckham Educational Fund to enable two qualified young engineers, Mr. G. B. Scott (Glasgow) and Mr. A. Yates (Cardiff) to attend Summer School Courses at the Institute of Gas Technology, Chicago, during the summer of 1960.

On loan

These engineers have submitted reports of their experiences which are available to those interested on loan from the Institution's Library.

Arrangements are being made for them to lecture to some of the Junior Gas Associations.

The revised Education Regulations giving full particulars of the amendments to the Associate Membership Examination which are to become operative in October 1962 will be printed early in the New Year, as will also be the revised regulations for the Certificate in Gas Salesmanship and Consumer Service.

Coal found in coke order: Board fined

THE East Midlands Gas Board, Burton section, was fined £10 and ordered to pay five guineas costs for including coal in a ton of fuel which was supplied to a customer who ordered coke.

The Board pleaded guilty to the charge of unlawfully applying a false trade description to coke, through Mr. A. R. M. Ellis, who said that the matter arose because a retort at Burton gasworks was insufficiently fired. It was not realised that any appreciable amount of coal had gone through with the coke.

Mr. H. Pipes ordered the coke from the Board. An Inspector of Weights and Measures who had examined it was said to have found that it contained 53.83% coke, 28.53% partly burned coal and 17.56% actual coal. Later the Board delivered 5 cwt. of coal to Mr. Pipes as compensation.

U.K. Lurgi plant No. 1 is in production

THE new Lurgi high-pressure gasification plant at Westfield, Fife, came into production on December 27.

Small quantities of gas are being passed into the super-grid and distributed to customers in Cardenden, Cowdenbeath, Kelty, Kinross and Lochgelly, and to the Glasgow area.

At present production is about 6 mill. cu.ft. of gas a day, and the output will be gradually built up during the next six weeks to 15 mill. cu.ft. a day, which is the amount to be produced in the first stage of construction.

Work continues on the second stage, and it is confidently anticipated that the works will be producing 30 mill. cu.ft. of gas a day early in 1962.

The Lurgi high-pressure gasification plant at Westfield is the first of its kind in Britain and only the fifth in the world. It is being built at a cost of £6,600,000.

Concurrently, a high-pressure super-grid is being constructed which, when linked with local distribution systems, will enable gas to be distributed over an area extending from Montrose, in the north, to Ayr in the south-west.

SULPHUR RECOVERY UNIT ORDER

PARSONS POWERGAS have received an order from the H. K. Ferguson Company to design, engineer and supply a sulphur recovery unit for Argentina.

The plant handles an acid feed gas and will produce 42 long tons per day of sulphur with a minimum purity of 99.5% at a recovery efficiency of not less than 95%.

York to be 'clean' in ten years

YORK City Council has agreed in principle to a series of smoke control orders being made over the next 10 years so that at the end of that period the whole city is covered by such orders.

The total expenditure over the whole city, with its 32,843 houses, would be about £271,368. It was stated that the degree of pollution in the city was high and about 50% of atmospheric pollution came from domestic chimneys.

Address change

The Sales Department of G. A. Harvey and Co. (London) Ltd., is now operating from Villiers House, Strand, W.C.2. The Publicity Department remains at Greenwich and all correspondence relating to advertising should be sent to Woolwich Road, London, S.E.7.

Ministry approves new Halifax smokeless zone

PROVISIONAL Ministerial approval has been given to the proposed No. 4 Smoke Control Area in Halifax, covering the largely residential and highly rated Savile Park and Skircost district. The local Health Committee has recommended that the Town Council make a smoke control order to come into operation on October 1.

The large number of houses with several fireplaces in the area accounts largely for the somewhat high average cost of conversion, which will be £20 7s. 3d., or an average cost to the householders of £6, according to a spokesman. This area contains 1,811 dwelling-houses subject to grant, costing an estimated £36,875 to convert to smokeless fuel burning appliances.

The Ministry's share of this will be £14,750, leaving £11,052 to be paid by the local authority and a similar amount by the householders. Also in the area are 182 commercial premises, 30 industrial premises and 77 other buildings not subject to grant.

Christmas turkey got the bird

THE Wales Gas Board's gift of a turkey with certain gas appliances bought before Christmas, evoked a complaint from Newport, Mon., Chamber of Commerce. The President of the Chamber said that it was entirely wrong that people selling one article should also offer the goods of another trader.

Another member complained that if the Board could afford to give a turkey with each appliance, it was an admission that the price of the appliance was too high.

Engineers tour Kents

A group of engineers who attended a British Coking Industry Association course in management at Weybridge, visited the Luton works of George Kent Ltd. They toured the Bisco Road Instrument Division, and the Mechanical Meter Division at Lea Works.

Action likely over highway reinstatement

JOINT action may be taken upon the question of repair of roads that have been inadequately reinstated by gas, water and other undertakings This action is advocated by Buckinghamshire county council, which wants other local authorities to support a proposition that the Public Utilities Street Works Act, 1950, should be amended.

This would give highway authorities power to prosecute the contractor and the undertaking if reinstatement did not comply with the requirements. In the event of a dispute, the courts would be required to determine whether such requirements had been fulfilled, and an engineering arbiter would decide whether they were reasonable.

A spokesman of the highways committee said the idea had been referred to a joint working group of officers representing the local authority associations concerned.

Gas shows in Australia

GAS and oil shows have been reported by three oil companies, reports the Melbourne correspondent of the *Financial Times*.

Frome-Broken Hill Company Pty. has found salt water saturated with gas in testing No. 2 well at Port Cambell, Victoria.

Union-Kern-Australian Oil and Gas Corporation is preparing to test strong gas shows at Cabawin No. 1 well, near Tara, Queensland.

Timor Oil has recovered gas-cut mud and 30 feet of oil-cut mud, plus a small amount of "green oil" from the Matai No. 1 well at Timor.

Charges rise in Ballymena

Gas charges in Ballymena (Co. Antrim) are to be increased by 10d. per 1,000 cu.ft. and coke prices are to be increased by 10s. per ton. These increases were adopted upon the recommendation of the Manager, Mr. D. R. Adams, because higher coal prices will cost the department an estimated £2,000 a year, and wages increases another £3,200 a year.

Lenny the Lion, assisted by Terry Hall, opened the Newhome Cooker Week which was held at the Hanley (Staffordshire) showrooms.

CONSIDER CLEGG AND AIRD . . .

Continued from page 15

for maintaining constant pressure, and devised a form of mechanical retort.

Clegg's gas plants were set up at Bristol, Birmingham, Chester and at the Royal Mint, this following a second example of overcoming popular prejudice.

Thus one reads of objections to Clegg's gasholders as liable to explode, particularly at Birmingham where they were considered a danger in any thunderstorm.

Fruitful period

In commemorating Clegg's fruitful period as gas engineer, one which saw his hydraulic main for separating tarry products installed at Manchester, it is appropriate to wonder how much further the gas industry would have benefited had he not turned to other fields.

A Liverpool engineering concern attracted his attention and his capital, all of which he lost and had to begin all over again. The Portuguese government set him to work as consulting engineer, with his son collaborating; hence his building of the Portuguese Mint and other public works.

Yet another disappointment following his Liverpool venture was his championing of the atmospheric system of rail transport, a scheme which failed.

NEW YEAR HONOURS

BARON—SIR ALEXANDER FLECK, Chairman, Advisory Council on Research and Development, Ministry of Power.

COMMANDER OF THE BRITISH EMPIRE—MR. T. MERVYN JONES, Chairman, Wales Gas Board.

ORDER OF THE BRITISH EMPIRE—MR. W. A. EVETTS, lately divisional engineer, Watford Division, Eastern Gas Board. LT.-COL. H. R. HEXTALL, Officer, Mersey Group, North Western Gas Board, Liverpool. MR. W. H. WHITE, Clerk of Works, Chief Engineer's Department, North Thames Gas Board.

BRITISH EMPIRE MEDAL—MR. N. BARKER, Gas Fitter, Keighley Undertaking, North Eastern Gas Board. MR. H. LILLEY, Foreman, Distribution Department, Sheffield District, East Midlands Gas Board. MR. C. E. NEWMAN, Foreman (Mains and Service), North Western Division, North Thames Gas Board.

OBITUARY

MR. CYRIL H. PEARSON, a director of Parkinson Cowan Ltd., has died at the age of 57. Mr. Pearson joined the staff of Parkinson Cowan in 1937, and in 1944 became director and general manager of the Gas Meter Division. In 1951 he was appointed a director on the Board of Parkinson Cowan, and in 1957 he relinquished executive control of the Gas Meter Division on his new appointment as Parent Company director in charge of three separate divisions of the Parkinson Cowan Group. More recently he has devoted the major part of his efforts to the export side of the Company.

MR. C. DOUGLAS BIRKS, the founder of Abbott, Birks and Co. Ltd., has died at the age of 70. Mr. Birks, who had been ill for some time, retired from the chairmanship of the Company early in 1960, but remained on the Board.

MR. JOHN BOYLE WILSON, manager of the Nairn district of the Scottish Gas Board, has died. Mr. Wilson had served the gas industry for 42 years, and had been at Nairn for six years, having come from Shotts, Lanarkshire.

MR. ARTHUR DOCKING, until June 1958 Chairman and Managing Director of Radiant-Heating Ltd., has died at the age of 78.

Charles A. Lewis writes:

With the passing of Arthur Docking, the gas industry loses another 'character' from the era of George Keith, Bill Dietrich, and George Helps.

Arthur Docking was born near a small gasworks at Wisbech in 1882 where his father was employed at the local gas company. Naturally, he accompanied his father in his moves to various works such as Thorney gasworks, Cambridge, Soham gasworks, Cambridge and Whitchurch, Hampshire.

This was in the days before the gas mantle was invented and where, on a Christmas morning, Arthur Docking and his father would count the rivets on a gasholder going down and wonder whether to recharge the horizontal retorts to ensure that their consumers had sufficient gas for their Christmas lunch.

In 1900 Mr. Docking left home and after experience with the Newmarket Gas Company, joined the Nottingham Gas Department, when he was quickly appointed chief inspector.

It was during his stay in Nottingham he became very interested in boxing and wrestling and was responsible for promoting boxing shows throughout the district. He often told me it was not very profitable but he had a lot of fun and he retained his interest in the sport throughout his life.

In 1910 he joined Selas and was responsible for the installation of the first air/gas mixing machines into this country, primarily for gas lighting. The mixing machines delivered 60/40 mixture of air/gas delivered at 10 in. w.g.

This was a boom time in the lace industry and this system obviously had advantages over low pressure or high pressure gas lighting, as 60% of the air used was filtered and thereby cut down maintenance on gas lights where the injectors were continually in need of attention due to fluff from the lace machines clogging the air ports. It was at this time Mr. Docking came into contact with George Keith as a competitor and they remained very firm friends until the death of Mr. Keith.

It was in 1932 that I first met Arthur Docking and in 1935 he was appointed general manager of Radiant Heating Ltd., which company he eventually controlled and remained Chairman of until disposing of his interest in 1958. He will be remembered by his very many friends in the gas industry as a forthright man and for his pioneering efforts during the early days of overhead gas heaters and the industrial application of gas.

The reader may be interested to know that Arthur Docking was responsible for the design and installation of the first gas-fired biscuit oven installed in this country at the site now occupied by the Gas Council, Watson House, when it was Macfarlane, the biscuit manufacturers.

Mr. Docking was a very keen golfer and did in fact win the S.G.B.I. Golf Cup at the age of 72.

Many will remember his kindly acts. He loved entertaining and was always in great form when surrounded by his friends.

Mr. Docking was a pioneer for industrial gas long before the gas companies were aware of the potential industrial load.

The gas industry has benefited by his efforts and those of us who have been fortunate to work closely with him are richer for his advice, help, and above all his friendship. After he retired he did not enjoy the best of health and was, unfortunately, confined to his bed for almost 12 months.

COMING EVENTS

January 13.—SCOTTISH JUNIORS: Industrial Section, 9, George Square, Glasgow. Address by A. McFadyen. 6.30 p.m.

January 14. — YORKSHIRE JUNIORS: Wakefield. Short Paper Day. 'Automatic Operation of Cyclic Gas-making Plant,' by A. Stubbs, and 'Trunk Feed to Vertical Retorts,' by R. Skilbeck.

January 17. — I.G.E., LONDON AND SOUTHERN SECTION: The Caxton Hall, Caxton Street, Westminster, S.W.1. 'Gas Characteristics Relative to Utilisation,' by L. W. Andrews. 2.45 p.m.

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